

WHAT IS CLAIMED IS:

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1. An optical transmission system
including:

a first optical transmission apparatus
having a first optical switch; and

10 a second optical transmission apparatus
having a second optical switch,

said optical transmission system being
capable of setting a connection relation between the
first optical transmission apparatus and the second
15 optical transmission apparatus,

wherein

the first optical transmission apparatus
includes:

a first transmission unit provided on an
20 input side of the first optical switch configured to
transmit a first control message including a
transmission port number of a transmission port for
transmitting the first control message; and

a transmission port control unit
25 configured to control the first optical switch so
that the first control message is transmitted
through different transmission ports sequentially.

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2. The optical transmission system as
claimed in claim 1, wherein

the second optical transmission apparatus
35 includes:

a first reception unit provided on an
output side of the second optical switch configured

to receive the first control message; and

5 a reception port control unit configured to control the second optical switch so that the first control message is received by the first reception unit through different reception ports sequentially.

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3. The optical transmission system as claimed in claim 1, wherein

15 the transmission port control unit controls the first optical switch so that the first control message is transmitted through different transmission ports sequentially and periodically.

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4. The optical transmission system as claimed in claim 2, wherein

25 after receiving the first control message, the first reception unit controls the reception port control unit so as to receive the first control message next time through a reception port having a reception port number next to a present reception port number.

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5. The optical transmission system as claimed in claim 2, wherein

35 the first optical transmission apparatus further comprises a second reception unit configured to receive a second control message including the

transmission port number and a reception port number
of the second optical transmission apparatus for
receiving the first control message,

wherein

5 after the second reception unit receives
the second control message, the first transmission
unit transmits a control message as the first
control message from a transmission port having a
transmission port number next to the transmission
10 port number included in the second control message,
the next transmission port number being included in
the control message transmitted by the first
transmission unit as the first control message.

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6. The optical transmission system as
claimed in claim 5, wherein

20 the second optical transmission apparatus
further comprises a second transmission unit
configured to transmit the second control message,
wherein

25 the reception port control unit controls
the second optical switch so that the first control
message is received through different reception
ports sequentially and periodically.

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7. An optical transmission system
including:

35 a first optical transmission apparatus
having a first optical switch; and
 a second optical transmission apparatus
having a second optical switch,

said optical transmission system being capable of setting a connection relation between the first optical transmission apparatus and the second optical transmission apparatus,

5 wherein
 the first optical transmission apparatus
includes:

an optical signal transmission unit provided on an input side of the first optical switch configured to transmit an optical signal;

10 a first transmission unit configured to transmit a first control message including a transmission port number of a transmission port for transmitting the optical signal; and

15 a transmission port control unit configured to control the first optical switch so that the optical signal is transmitted through different transmission ports sequentially and periodically.

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8. The optical transmission system as
25 claimed in claim 7, wherein
the second optical transmission apparatus
includes:

an optical signal reception unit provided
on an output side of the second optical switch
30 configured to receive the optical signal; and
a reception port control unit configured
to control the second optical switch so that the
optical signal is received by the optical signal
reception unit through different reception ports
35 sequentially,

wherein
after receiving the optical signal, the

optical signal reception unit controls the reception port control unit so as to receive the optical signal next time through a reception port having a reception port number next to a present reception
5 port number.

10 9. An optical transmission system
including:
 a first optical transmission apparatus
 having a first optical switch; and
 a second optical transmission apparatus
15 having a second optical switch,
 said optical transmission system being
capable of setting a connection relation between the
first optical transmission apparatus and the second
optical transmission apparatus,
20 wherein
 the first optical transmission apparatus
includes:
 an optical signal transmission unit
provided on an input side of the first optical
25 switch configured to transmit an optical signal;
 a transmission port control unit
configured to control the first optical switch;
 a first transmission unit configured to
transmit a first control message including a
30 transmission port number of a transmission port for
transmitting the optical signal; and
 a first reception unit configured to
receive a second control message including the
transmission port number and a reception port number
35 of a reception port of the second optical
transmission apparatus for receiving the optical
signal,

wherein

after the first reception unit receives the second control message, the transmission port control unit controls the first optical switch so
5 that the optical signal is transmitted through a transmission port having a transmission port number next to the transmission port number included in the second control message.

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10. The optical transmission system as claimed in claim 9, wherein

15 the second optical transmission apparatus includes:

an optical signal reception unit provided on an output side of the second optical switch configured to receive the optical signal;

20 a reception port control unit configured to control the second optical switch so that the optical signal is received by the optical signal reception unit through different reception ports sequentially;

25 a second transmission unit configured to transmit the second control message; and

a second reception unit configured to receive the first control message,

wherein

30 the optical signal reception unit controls the reception port control unit so as to receive the optical signal through different reception ports sequentially and periodically.

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11. An optical transmission system including:

a first optical transmission apparatus
having a first optical switch; and

a second optical transmission apparatus
having a second optical switch,

5 said optical transmission system being
capable of setting a connection relation between the
first optical transmission apparatus and the second
optical transmission apparatus,

 wherein

10 the first optical transmission apparatus
includes:

 a test signal transmission unit provided
on an input side of the first optical switch
configured to transmit a test signal;

15 a transmission unit configured to transmit
a control message including a transmission port
number of a transmission port for transmitting the
test signal,

 wherein

20 the test signal transmission unit
transmits the test signal through different
transmission ports sequentially, separated by a
predetermined time period.

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12. The optical transmission system as
claimed in claim 11, wherein

30 the second optical transmission apparatus
includes:

 a test signal reception unit provided on
an output side of the second optical switch
configured to receive the test signal to monitor a
35 reception state;

 a reception unit configured to receive the
control message.

5 13. An optical transmission system
including:
 a first optical transmission apparatus
having a first optical switch; and
 a second optical transmission apparatus
10 having a second optical switch,
 said optical transmission system being
capable of setting a connection relation between the
first optical transmission apparatus and the second
optical transmission apparatus,
15 wherein
 the first optical transmission apparatus
includes:
 a test signal transmission unit provided
on an input side of the first optical switch
20 configured to transmit a test signal;
 a first transmission unit configured to
transmit a first control message including a
transmission port number of a transmission port for
transmitting the test signal; and
25 a first reception unit configured to
receive a second control message including the
transmission port number and a reception port number
of a reception port of the second optical
transmission apparatus for receiving the test signal,
30 wherein
 after the first reception unit receives
the second control message, the test signal
transmission unit transmits the test signal through
a transmission port having a transmission port
35 number next to the transmission port number included
in the second control message.

14. The optical transmission system as
5 claimed in claim 13, wherein
the second optical transmission apparatus
includes:

a test signal reception unit provided on
an output side of the second optical switch
10 configured to receive the test signal to monitor a
reception state;

a second transmission unit configured to
transmit the second control message; and

a second reception unit configured to
15 receive the first control message.

20 15. The optical transmission system as
claimed in claim 1, wherein
the first transmission unit transmits a
plurality of control messages simultaneously.

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16. The optical transmission system as
claimed in claim 2, further comprising

30 a control message reception waiting timer
that starts to count the time when the first control
message is received, and terminates after a
predetermined time period,

wherein

35 when the control message reception waiting
timer terminates, the reception port control unit
controls the second optical switch so that the first

control message is received through a different reception port.

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17. The optical transmission system as claimed in claim 7, wherein

the second optical transmission apparatus
10 includes:

an optical signal reception unit provided on an output side of the second optical switch configured to receive the optical signal;

a reception port control unit configured
15 to control the second optical switch so that the optical signal is received by the optical signal reception unit through different reception ports sequentially; and

a control message reception waiting timer
20 that starts to count the time when the first control message is received, and terminates after a predetermined time period,

wherein

when the control message reception waiting
25 timer terminates, the reception port control unit controls the second optical switch so that the first control message is received through a different reception port.

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18. The optical transmission system as claimed in claim 1, wherein

the first optical transmission apparatus
35 includes:

a first reception unit configured to

receive a second control message including the
transmission port number and a reception port number
of a reception port of the second optical
transmission apparatus for receiving the first
5 control message; and

a control message reception waiting timer
that starts to count the time when the second
control message is received, and terminates after a
predetermined time period,

10 wherein

when the control message reception waiting
timer terminates, the transmission port control unit
controls the first optical switch so that the first
control message is transmitted through a next
15 transmission port, the next transmission port number
being included in said transmitted first control
message.

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19. An optical transmission system
including:

a first optical transmission apparatus
25 having a first optical switch; and

a second optical transmission apparatus
having a second optical switch,

said optical transmission system being
capable of setting a connection relation between the
30 first optical transmission apparatus and the second
optical transmission apparatus ,

wherein

the first optical transmission apparatus
includes:

35 an optical signal transmission unit
provided on an input side of the first optical
switch configured to transmit an optical signal;

a transmission port control unit
configured to control the first optical switch;

a first transmission unit configured to
transmit a first control message including a
5 transmission port number of a transmission port for
transmitting the optical signal;

a first reception unit configured to
receive a second control message including the
transmission port number and a reception port number
10 of a reception port of the second optical
transmission apparatus for receiving the optical
signal; and

a control message reception waiting timer
that starts to count the time when the second
15 control message is received, and terminates after a
predetermined time period,

wherein

when the control message reception waiting
timer terminates, the transmission port control unit
20 controls the first optical switch so that the first
control message is transmitted from a next
transmission port.

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20. The optical transmission system as
claimed in claim 1, wherein

a link summary message including a
30 connection relation between the first optical
transmission apparatus and the second optical
transmission apparatus is exchanged therebetween;
and

transmission ports and reception ports not
35 in agreement or not recognized in the connection
relation between the first optical transmission
apparatus and the second optical transmission

apparatus are used for searching for and setting the transmission port number and a reception port number.

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21. The optical transmission system as claimed in claim 1, wherein

when errors occur in transmission between
10 the first optical transmission apparatus and the second optical transmission apparatus,

transmission ports and reception ports related to the erroneous transmission are used for searching for and setting the transmission port
15 number and a reception port number.

20 22. An optical transmission apparatus having an optical switch capable of setting a connection relation with another optical transmission apparatus opposite thereto, including:

a transmission unit provided on an input
25 side of the optical switch configured to transmit a first control message including a transmission port number of a transmission port for transmitting the first control message; and

a transmission port control unit
30 configured to control the optical switch so that the first control message is transmitted through different transmission ports sequentially.

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23. The optical transmission apparatus as

claimed in claim 22, wherein the transmission port control unit controls the optical switch so that the first control message is transmitted through different transmission ports sequentially and
5 periodically.

10 24. The optical transmission apparatus as claimed in claim 22, further comprising
 a reception unit configured to receive a second control message including the transmission port number and a reception port number of the
15 opposite optical transmission apparatus for receiving the first control message,
 wherein
 after the reception unit receives the second control message, the transmission unit
20 transmits a control message as the first control message from a transmission port having a transmission port number next to the transmission port number included in the second control message, the next transmission port number being included in
25 the transmitted control message.

30 25. An optical transmission apparatus having an optical switch capable of setting a connection relation with another optical transmission apparatus opposite thereto, including:
 a reception unit provided on an output
35 side of the optical switch configured to receive a control message; and
 a reception port control unit configured

to control the optical switch so that the control message is received through different reception ports sequentially.

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26. The optical transmission apparatus as claimed in claim 25, wherein

10 after receiving the control message, the reception unit controls the reception port control unit so as to receive the control message next time through a reception port having a reception port number next to a present reception port number.

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27. The optical transmission apparatus as claimed in claim 26, wherein

20 the reception port control unit controls the optical switch so that the control message is received through different reception ports sequentially and periodically.

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28. An optical transmission apparatus

30 having an optical switch capable of setting a connection relation with another optical transmission apparatus opposite thereto, including:

 an optical signal transmission unit provided on an input side of the optical switch
35 configured to transmit an optical signal;

 a transmission unit configured to transmit a control message; and

a transmission port control unit
configured to control the optical switch so that the
optical signal is transmitted through different
transmission ports sequentially and periodically.

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29. An optical transmission apparatus
10 having an optical switch capable of setting a
connection relation with another optical
transmission apparatus opposite thereto, including:
an optical signal transmission unit
provided on an input side of the optical switch
15 configured to transmit an optical signal;
a transmission port control unit
configured to control the optical switch;
a transmission unit configured to transmit
a first control message including a transmission
20 port number of a transmission port for transmitting
the optical signal; and
a reception unit configured to receive a
second control message including the transmission
port number and a reception port number of a
25 reception port of the opposite optical transmission
apparatus for receiving the optical signal,
wherein
after the reception unit receives the
second control message, the transmission port
30 control unit controls the optical switch so that the
optical signal is transmitted through a transmission
port having a transmission port number next to the
transmission port number included in the second
control message.

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30. An optical transmission apparatus having an optical switch capable of setting a connection relation with another optical transmission apparatus opposite thereto, including:
5 a test signal transmission unit provided on an input side of the optical switch configured to transmit a test signal;
a transmission unit configured to transmit
10 a control message including a transmission port number of a transmission port for transmitting the test signal,
wherein
the test signal transmission unit
15 transmits the test signal through different transmission ports sequentially, separated by a predetermined time period.

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31. An optical transmission apparatus having an optical switch capable of setting a connection relation with another optical transmission apparatus opposite thereto, including:
25 a test signal transmission unit provided on an input side of the optical switch configured to transmit a test signal;
a transmission unit configured to transmit
30 a first control message including a transmission port number of a transmission port for transmitting the test signal; and
a reception unit configured to receive a second control message including the transmission
35 port number and a reception port number of a reception port of the opposite optical transmission apparatus for receiving the test signal,

wherein

after the reception unit receives the
second control message, the test signal transmission
unit transmits the test signal through a
5 transmission port having a transmission port number
next to the transmission port number included in the
second control message.